WHAT IS CLAIMED IS:

1 1.   A method for computing a diversity measure for a predetermined combinatorial

2 structure C having n elements, the method comprising steps of:

3 (a)   identifying M substructures c_1 through c_M each having m elements from among the n

4 elements of the predetermined combinatorial structure C, where M equals $n! / [(n-m)! \, m!]$;

5 (b)   for each substructure c_i, for i from 1 to M, determining a number n_i of the M

6 substructures c_1 through c_M that are similar to the substructure c_i; and

7 (c)   computing a first entropy $\Phi(m)$ based upon all the numbers n_i computed during step

8 (b) and based upon M in computed step (a);

1 2.   A method as in claim 1, further comprising the steps of:

2 (d)   repeating steps (a) and (b) with m+1 substituted for m;

3 (e)   computing a second entropy $\Phi(m+1)$ based upon all the numbers n_i and M computed

4 during step (d); and

5 (f)   subtracting the second entropy $\Phi(m+1)$ from the first entropy $\Phi(m)$ to produce the

6 diversity measure.

1 3.   A method as in claim 2, wherein steps (c) and (e) comprise the steps of:

2   for each i from 1 to M:

3   computing a fraction F_i by dividing n_i by M; and

4   computing a logarithm of fraction F_i;

5   computing a sum by adding all logarithms of fractions F_i for i from 1 to M; and

6   dividing the sum by M.

1 4.   A method as in claim 2, wherein step (b) comprises the steps of, for each substructure

2 c_i for i from 1 to M:

3   for each substructure c_j for j from 1 to M:

4   computing a distance function $d(c_i, c_j)$ representing a measure of a difference

5   between substructure c_i and substructure c_j;

6   comparing the distance function $d(c_i, c_j)$ to a threshold; and

7   determining the substructures c_i and c_j to be similar if and only if the distance

8   function $d(c_i, c_j)$ is less than the threshold.

1   5.   A method as in claim 2, wherein steps (c) and (e) comprise the steps of:

2   for each distinct substructure c_i:

3   computing a frequency f_i by dividing n_i by M;

4   computing a logarithm of frequency f_i; and

5   computing a product by multiplying the frequency f_i and the logarithm of

6   frequency f_i; and

7   computing a sum by adding all products of the frequencies f_i and the logarithms of

8   frequencies f_i.

1   6.   A method as in claim 2, wherein step (b) comprises the steps of:

2   for each substructure c_i for i from 1 to M:

3   monotonically renumbering m elements of c_i from 1 to m; and

4   for each substructure c_j for j from 1 to M:

5   monotonically renumbering m elements of c_j from 1 to m; and

6   determining the substructures c_i and c_j to be similar if and only if they are

7   identical.

1   7.   A method as in claim 2, wherein step (b) comprises the steps of:

2   for each substructure c_i for i from 1 to M:

3   monotonically renumbering m elements of c_i from 1 to m; and

4   for each substructure c_j for j from 1 to M:

5   monotonically renumbering m elements of c_j from 1 to m; and

6   determining the substructures c_i and c_j to be similar if and only if they are

7   identical or isomorphic.

1   8.   A method as in claim 2, wherein steps (c) and (e) comprise the steps of:

2   for each distinct substructure c_i:

3   computing a frequency f_i by dividing n_i by M;

4   computing a quotient by dividing the frequency f_i by an expected frequency p_i;

5   computing a logarithm of quotient q_i; and

6   computing a product by multiplying the frequency f_i and the logarithm of

7   quotient q_i; and

8   computing a sum by adding all products of the frequencies f_i and the logarithms of

9   quotients q_i.

1   9.   A method as in claim 2, wherein the predetermined combinational structure C

2   comprises a linked graph, wherein the n elements comprise n nodes.

1   10.   A computer readable storage medium, comprising:

2   computer readable program code embodied on said computer readable storage

3   medium, said computer readable program code for programming a computer to perform a

4   method for computing a diversity measure for a predetermined combinatorial structure C

5   having n elements, the method comprising steps of:

6   (a)   identifying M substructures c_1 through c_M each having m elements from among the n

7   elements of the predetermined combinatorial structure C, where M equals n! / [(n-m)! m!];

8   (b)   for each substructure c_i, for i from 1 to M, determining a number n_i of the M

9   substructures c_1 through c_M that are similar to the substructure c_i; and

10   (c)   computing a first entropy $\Phi(m)$ based upon all the numbers n_i computed during step

11   (b) and based upon M in computed step (a);

12

13   11.   A computer readable storage medium as in claim 10, the method further comprising

14   the steps of:

15   (d)   repeating steps (a) and (b) with m+1 substituted for m;

16   (e)   computing a second entropy $\Phi(m+1)$ based upon all the numbers n_i and M computed

17   during step (d); and

18   (f)   subtracting the second entropy $\Phi(m+1)$ from the first entropy $\Phi(m)$ to produce the

19   diversity measure.

1   12.   A computer readable storage medium as in claim 11, wherein steps (c) and (e)

2   comprise the steps of:

3   for each i from 1 to M:

4   computing a fraction F_i by dividing n_i by M; and

5   computing a logarithm of fraction F_i;

6   computing a sum by adding all logarithms of fractions F_i for i from 1 to M; and

7   dividing the sum by M.

1   13.   A computer readable storage medium as in claim 11, wherein step (b) comprises the

2   steps of, for each substructure c_i for i from 1 to M:

3   for each substructure c_j for j from 1 to M:

4   computing a distance function $d(c_i,c_j)$ representing a measure of a difference

5   between substructure c_i and substructure c_j;

6   comparing the distance function $d(c_i,c_j)$ to a threshold; and

7   determining the substructures c_i and c_j to be similar if and only if the distance

8   function $d(c_i,c_j)$ is less than the threshold.

1   14.   A computer readable storage medium as in claim 11, wherein steps (c) and (e)

2   comprise the steps of:

3   for each distinct substructure c_i:

4   computing a frequency f_i by dividing n_i by M;

5   computing a logarithm of frequency f_i; and

6   computing a product by multiplying the frequency f_i and the logarithm of

7   frequency f_i; and

8   computing a sum by adding all products of the frequencies f_i and the logarithms of

9   frequencies f_i.

1   15.   A computer readable storage medium as in claim 11, wherein step (b) comprises the

2   steps of:

3   for each substructure c_i for i from 1 to M:

4   monotonically renumbering m elements of c_i from 1 to m; and

5   for each substructure c_j for j from 1 to M:

6   monotonically renumbering m elements of c_j from 1 to m; and

7   determining the substructures c_i and c_j to be similar if and only if they are

8   identical.

1   16.   A computer readable storage medium as in claim 11, wherein step (b) comprises the

2   steps of:

3   for each substructure c_i for i from 1 to M:

4   monotonically renumbering m elements of c_i from 1 to m; and

5   for each substructure c_j for j from 1 to M:

6   monotonically renumbering m elements of c_j from 1 to m; and

7   determining the substructures c_i and c_j to be similar if and only if they are

8   identical or isomorphic.

1   17.   A computer readable storage medium as in claim 11, wherein steps (c) and (e)

2   comprise the steps of:

3   for each distinct substructure c_i:

4   computing a frequency f_i by dividing n_i by M;

5   computing a quotient by dividing the frequency f_i by an expected frequency p_i;

6   computing a logarithm of quotient q_i; and

7   computing a product by multiplying the frequency f_i and the logarithm of

8   quotient q_i; and

9   computing a sum by adding all products of the frequencies f_i and the logarithms of

10 quotients q_i.

1   18.   A computer readable storage medium as in claim 11, wherein the predetermined

2   combinational structure C comprises a linked graph, wherein the n elements comprise n nodes.

1   19.   A computer system, comprising:

2   a processor; and

3   a processor readable storage medium coupled to the processor having processor

4   readable program code embodied on said processor readable storage medium, said processor

5   readable program code for programming the computer system to perform a method for

6   computing a diversity measure for a predetermined combinatorial structure C having n

7   elements, the method comprising steps of:

8   (a)   identifying M substructures c_1 through c_M each having m elements from among the n

9   elements of the predetermined combinatorial structure C, where M equals n! / [(n-m)! m!];

10   (b)   for each substructure c_i, for i from 1 to M, determining a number n_i of the M

11   substructures c_1 through c_M that are similar to the substructure c_i; and

12   (c)   computing a first entropy $\Phi(m)$ based upon all the numbers n_i computed during step

13   (b) and based upon M in computed step (a);

1   20.   A computer system as in claim 19, the method further comprising the steps of:

2   (d)   repeating steps (a) and (b) with m+1 substituted for m;

3   (e)   computing a second entropy $\Phi(m+1)$ based upon all the numbers n_i and M computed

4   during step (d); and

5   (f)   subtracting the second entropy $\Phi(m+1)$ from the first entropy $\Phi(m)$ to produce the

6   diversity measure.

1   21.   A computer system as in claim 20, wherein steps (c) and (e) comprise the steps of:

2   for each i from 1 to M:

3   computing a fraction F_i by dividing n_i by M; and

4   computing a logarithm of fraction F_i;

5   computing a sum by adding all logarithms of fractions F_i for i from 1 to M; and

6   dividing the sum by M.

1   22.   A computer system as in claim 20, wherein step (b) comprises the steps of, for each

2   substructure c_i for i from 1 to M:

3   for each substructure c_j for j from 1 to M:

4   computing a distance function $d(c_i,c_j)$ representing a measure of a difference

5   between substructure c_i and substructure c_j;

6 comparing the distance function $d(c_i,c_j)$ to a threshold; and

7 determining the substructures c_i and c_j to be similar if and only if the distance

8 function $d(c_i,c_j)$ is less than the threshold.

1 23. A computer system as in claim 20, wherein steps (c) and (e) comprise the steps of:

2 for each distinct substructure c_i:

3 computing a frequency f_i by dividing n_i by M;

4 computing a logarithm of frequency f_i; and

5 computing a product by multiplying the frequency f_i and the logarithm of

6 frequency f_i; and

7 computing a sum by adding all products of the frequencies f_i and the logarithms of

8 frequencies f_i.

1 24. A computer system as in claim 20, wherein step (b) comprises the steps of:

2 for each substructure c_i for i from 1 to M:

3 monotonically renumbering m elements of c_i from 1 to m; and

4 for each substructure c_j for j from 1 to M:

5 monotonically renumbering m elements of c_j from 1 to m; and

6 determining the substructures c_i and c_j to be similar if and only if they are

7 identical.

1 25. A computer system as in claim 20, wherein step (b) comprises the steps of:

2 for each substructure c_i for i from 1 to M:

3 monotonically renumbering m elements of c_i from 1 to m; and

4 for each substructure c_j for j from 1 to M:

5 monotonically renumbering m elements of c_j from 1 to m; and

6 determining the substructures c_i and c_j to be similar if and only if they are

7 identical or isomorphic.

1 26. A computer system as in claim 20, wherein steps (c) and (e) comprise the steps of:

2 for each distinct substructure c_i:

3   computing a frequency f_i by dividing n_i by M;

4   computing a quotient by dividing the frequency f_i by an expected frequency p_i;

5   computing a logarithm of quotient q_i; and

6   computing a product by multiplying the frequency f_i and the logarithm of

7 quotient q_i; and

8   computing a sum by adding all products of the frequencies f_i and the logarithms of

9 quotients q_i.

1   27.   A computer system as in claim 20, wherein the predetermined combinational structure

2   C comprises a linked graph, wherein the n elements comprise n nodes.